

## WHAT IS CLAIMED IS:

1. An isolated nucleic acid encoding UDP- galactose:  $\beta$ - *N*-acetylglucosamine  $\beta$ 1, 3-galactosyltransferase ( $\beta$ 3Gal-T5).  
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2. The isolated nucleic acid as defined in claim 1, wherein said nucleic acid is DNA.
3. The isolated nucleic acid as defined in claim 2, wherein said DNA is cDNA.  
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4. An isolated nucleic acid as defined in claim 2, wherein said DNA is genomic DNA.
5. An isolated nucleic acid as defined in claim 1, wherein said nucleic acid  
15 comprises the nucleotide sequence of nucleotides 1-930 as set forth in Figure 1 or sequence-conservative or function-conservative variants thereof.
6. An isolated nucleotide sequence comprising nucleotides 73-930 as set forth  
in Figure 1.  
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7. An isolated nucleotide sequence comprising nucleotides selected from the group consisting of nucleotides 1-200; nucleotides 201-400; nucleotides 401-600; nucleotides 601-800; and nucleotides 801-930 of claim 1 that hybridizes to a nucleic acid under stringent conditions.  
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8. An isolated nucleic acid which hybridize under conditions of high stringency with the nucleic acid having the sequence of nucleotides 1-930 as set fourth in Figure 1.
9. A nucleic acid vector comprising a nucleic acid sequence encoding  $\beta$ 3Gal-T5 or fragments thereof.  
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10. A vector as defined in claim 9, wherein said sequence comprises the nucleotide sequence of nucleotides 1-930 as set forth in Figure 1 or sequence-conservative or function-conservative variants thereof.
- 5 11. The vector as defined in claim 10, wherein said sequence encoding  $\beta$ 3Gal-T5 is operably linked to a transcriptional regulatory element.
12. A nucleic acid vector comprising the nucleotide sequence of claim 5.
- 10 13. A nucleic acid vector comprising the nucleotide sequence of claim 6.
14. A host cell comprising a vector as defined in claim 9.
- 15 15. A host comprising a vector as defined in claim 11, wherein said cell is stably transfected with said vector.
16. The host cell as defined in claim 14, wherein said cell is stably transfected with said vector.
- 20 17. The host cell as defined in claim 13, wherein said cell produces enzymatically active  $\beta$ 3Gal-T5.
- 25 18. The host cell as defined in claim 13, wherein said cell is selected from the group consisting of bacterial, yeast, insect, avian, and mammalian cells.
19. The host cell as defined in claim 17, wherein said cell is selected from the group consisting of bacterial, yeast, insect, avian, and mammalian cells.
- 30 20. A cell as defined in claim 19, wherein said cell is Sf9.
21. A cell as defined in claim 19, wherein said cell is CHO.

22. A host cell comprising the nucleic acid vector of claim 12.
23. A host cell comprising the nucleic acid vector of claim 13.
- 5 24. A method for producing  $\beta$ 3Gal-T5 polypeptides, which comprises:
- (i) introducing into a host cell an isolated DNA molecule encoding a human  $\beta$ 3Gal-T5, or a DNA construct comprising a DNA sequence encoding  $\beta$ 3Gal-T5;
  - 10 (ii) growing the host cell under conditions suitable for human  $\beta$ 3Gal-T5 expression; and
  - (iii) isolating  $\beta$ 3Gal-T5 produced by the host cell.
25. An isolated UDP- galactose:  $\beta$ - N-acetylglucosamine  $\beta$ 1, 3- galactosyltransferase ( $\beta$ 3Gal-T5) polypeptide.

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**AMENDED CLAIMS**

[received by the International Bureau on 03 April 2000 (03.04.00);  
original claims 1-21, 24 and 25 amended; new claims 26-37 added;  
remaining claims unchanged (5 pages)]

1. An isolated nucleic acid of less than 10,000 nucleotides or a complement thereof comprising a nucleotide sequence encoding UDP-galactose:  $\beta$ -N-acetylglucosamine  $\beta$ 1,3galactosyltransferase ( $\beta$ 3Gal-T5) (SEQ ID NO:9).  
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2. The isolated nucleic acid of claim 1 which is DNA.
3. The isolated DNA of claim 2 which is cDNA or genomic DNA.  
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4. The isolated nucleic acid of claim 1 which is RNA.
5. An isolated nucleic acid of less than 10,000 nucleotides or a complement thereof comprising a nucleotide sequence encoding  $\beta$ 3Gal-T5 (SEQ ID NO:9),  
15 or a function-conservative variant thereof.
6. An isolated nucleic acid of less than 10,000 nucleotides or a complement thereof comprising nucleotides 73-930 as set forth in Figure 1, or a sequence-conservative or a function-conservative variant thereof.  
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7. An isolated nucleic acid of less than 10,000 nucleotides or a complement thereof consisting of at least 20 contiguous nucleotides selected from nucleotides 1-115 and 428-1011 of SEQ ID NO:8.  
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8. An isolated nucleic acid of less than 10,000 nucleotides or a complement thereof which hybridizes under preferred hybridization conditions with a nucleic acid consisting of at least 20 contiguous nucleotides selected from nucleotides 1-115 and 428-1011 of SEQ ID NO:8.  
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9. A nucleic acid vector of less than 50,000 nucleotides comprising a first nucleotide sequence identical to or derived from a second nucleotide sequence

encoding  $\beta$ 3Gal-T5 (SEQ ID NO:9) or a fragment thereof having at least 15 amino acid residues.

5                   10.     A nucleic acid vector of less than 10,000 nucleotides comprising a first nucleotide sequence identical to or derived from a second nucleotide sequence encoding  $\beta$ 3Gal-T5 (SEQ ID NO:9) or a fragment thereof having at least 120 amino acid residues.

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                  12.     A nucleic acid vector of less than 50,000 nucleotides comprising the nucleotide sequence of Claim 5.

15                   13.     A nucleic acid vector of less than 50,000 nucleotides comprising the nucleotide sequence of Claim 6.

                  14.     A host cell comprising the nucleic acid vector of Claim 10.

20                   15.     A host cell stably transfected with the nucleic acid vector of Claim 11.

                  16.     The host cell of Claim 14, wherein the nucleic acid vector is stably  
25 transfected.

                  17.     The host cell of Claim 14 which produces  $\beta$ 3Gal-T5 enzymatic activity.

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19. The host cell of Claim 17 which is selected from the group consisting of a bacterial cell, a yeast cell, an insect cell, an avian cell and a mammalian cell.
- 5 20. The insect cell of Claim 19 which is a *Spodoptera frugiperda* cell.
21. The mammalian Cell of claim 19 which is a chinese hamster ovary cell.
- 10 22. A host cell comprising the nucleic acid vector of Claim 12.
23. A host cell comprising the nucleic acid vector of Claim 13.
24. A method for producing a  $\beta$ 3Gal-T5 polypeptide (SEQ ID NO:9), a  
15 fragment thereof having at least 30 amino acid residues, or a function-conservative variant of the polypeptide or fragment, which comprises:
- (i) introducing into a host cell a nucleic acid encoding the  $\beta$ 3Gal-T5 polypeptide, fragment or variant;
- (ii) growing the host cell under conditions suitable for expression of the  
20 nucleic acid introduced; and
- (iii) isolating the  $\beta$ 3Gal-T5 polypeptide, fragment or variant expressed by the host cell.
- 25 25. An isolated  $\beta$ 3Gal-T5 polypeptide (SEQ ID NO:9).
26. An isolated  $\beta$ 3Gal-T5 polypeptide (SEQ ID NO:9) or a fragment thereof having at least 5 amino acid residues.
27. An isolated  $\beta$ 3Gal-T5 polypeptide (SEQ ID NO:9), a fragment  
30 thereof having at least 50 amino acid residues, or a function-conservative variant of the polypeptide or fragment.

28. An isolated  $\beta$ 3Gal-T5 polypeptide comprising or consisting of the amino acid sequence as set forth in SEQ ID NO:9.
- 5 29. An isolated derivative or fragment of the polypeptide of Claim 28 consisting of at least 10 contiguous amino acids of the  $\beta$ 3Gal-T5 polypeptide.
30. The derivative or fragment of Claim 29 which displays one or more functional activities of the  $\beta$ 3Gal-T5 polypeptide.
- 10 31. The derivative or fragment of Claim 29 which is capable of immunospecific binding to an antibody raised against a  $\beta$ 3Gal-T5 polypeptide.
- 15 32. A fusion protein comprising a fragment of the  $\beta$ 3Gal-T5 polypeptide of Claim 28 consisting of at least 10 contiguous amino acids of the  $\beta$ 3Gal-T5 polypeptide fused by a covalent bond to an amino acid sequence of a second protein, which second protein is not a  $\beta$ 3Gal-T5 polypeptide.
- 20 33. An isolated galactosyltransferase capable of transferring galactose  $\beta$ 1-3 to an acceptor substrate selected from the group consisting of GalNAc $\beta$ 1-3Gal $\alpha$ 1-4Gal $\beta$ 1-4Glc $\beta$ 1-Cer, Glc $\beta$ 1-Cer, GalNAc $\beta$ 1-4Gal $\beta$ 1-4Glc $\beta$ 1-Cer, GlcNAc $\beta$ 1-3Gal $\beta$ 1-4Glc $\beta$ 1-Cer, and GlcNAc $\beta$ 1-3Gal $\beta$ 1-4GlcNAc $\beta$ 1-3Gal $\beta$ 1-4Glc $\beta$ 1-Cer.
- 25 34. An isolated  $\beta$ 3Gal-T5 polypeptide (SEQ ID NO:9), a fragment thereof or a function-conservative variant of the polypeptide or fragment which is capable of transferring galactose  $\beta$ 1-3 to GalNAc $\beta$ 1-3Gal $\alpha$ 1-4Gal $\beta$ 1-4Glc $\beta$ 1-Cer.
- 30 35. A purified antibody or an antigen-binding fragment or derivative thereof capable of immunospecific binding to the polypeptide of any one of Claims 25-28 and not to another galactosyltransferase.

36. The antibody of Claim 35 which is selected from the group consisting of a polyclonal antibody, a monoclonal antibody, a chimeric antibody and a humanized antibody.

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37. The monoclonal antibody of Claim 36 which is UH9.

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